DoD Spectrum Workshop
12-16 December 2011
Annapolis, MD

Airborne GPS Re-radiation
Spectrum Supportability Efforts, Policy and Outcome

Agenda

- Background
- NTIA Policies on Fixed & Land-Based Mobile GPS Re-Radiators
- Airborne GPS Re-Radiators
  - Requirements
  - Testing & Interference Analyses
  - Outcome NTIA Policy

Background

- In early 2000, Global Positioning System (GPS) Re-radiator was sold at Wal-Mart. After DoD raised safety-of-life concerns to FCC, sale of GPS Re-radiator was prohibited

- In 2004, FCC submitted to NTIA Interdepartment Radio Advisory Committee (IRAC) Public Notice Regarding GPS Networking Petition for Rulemaking to Market GPS Re-Radiation Kits
  - FCC Part 15.211 or other appropriate provisions
  - Response by DoD IRAC representatives
    - FCC Part 18 for Industrial, Scientific, Medical (ISM) bands
    - Additional information and analysis required to recommend appropriate regulatory frame work

Fixed GPS Re-Radiators

- 2005 – NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management, Section 8.3.28, Use of Fixed Devices that Re-radiate Signals Received from the GPS
  - Authorization for indoor use only and required for each device at specific site
  - Frequency assignment should be a “XT” station for a maximum of 2 years with possible renewal and under control of military or contractor facility for testing radio navigation satellite system equipment/systems.
  - Based on free space propagation with no allowance for additional attenuation, the calculated maximum effective isotropic radiated power (EIRP) should not be greater than -140 dBm/24 MHz at 100 ft (30 meters) from the test location
  - A “Stop Buzzer” point of contact must be available at all times
  - Approved frequency assignments will be entered in Government Master File

Land-Based Mobile GPS Re-Radiators

- NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management, Section 8.3.29, Use of Land-Based Mobile Devices that Re-radiate Signals Received from the GPS
  - Use is restricted to inside armored ground vehicles operating within a federal government controlled range/facility/installation or cordoned zone
  - Frequency assignment
    - A “NR” station for a maximum of 2 years with possible renewal
    - Testing radio navigation satellite system equipment/systems
    - Number of vehicles equipped with these devices
  - Calculated maximum EIRP should not be greater than -88 dBm/24 MHz at the output of GPS re-radiator antenna from an armored ground vehicle
  - A “Stop Buzzer” point of contact must be available at all times
  - Approved frequency assignments will be entered in Government Master File

Prior to August 2010, airborne use of GPS Re-Radiators was not authorized

Requirements for Airborne GPS Re-Radiator

- Summer 2007 – Naval Air System Command Program Office submitted DD1494 for Marines V-22 GPS Re-Radiator
  - V-22 operational requirement identified in Capability Development Document (CDD)
  - A GPS location repeater inside the cabin provides embarked troops the ability to update their GPS location data while aboard the aircraft and precluding hazardous delays in the zone while waiting for the GPS update
- Fall 2007 – Marines MV-22 deployment of airborne GPS Re-Radiator in CENTCOM

Testing and Interference Analyses for Airborne GPS Re-Radiators

- Coordinated and negotiated with FAA and NTIA for initial test in a shielded hangar at Patuxent River, MD in December 2007

- Multiple meetings in 2008-2010 between NMSC, Navy Program Office with key stakeholders of Radio Navigation Satellite System (RNSS) Experts Group, Air Force, FAA, and NASA
  - Measurements from testing in a shielded hangar
  - Detailed test plan
  - RF impact on the aircraft using GPS re-radiator
  - Interference analyses to TACAN, DME, GPS receiver MAGR 2000, and radar
  - Define Concept of Operation

Outcome NTIA Policy on Airborne GPS Re-Radiators

- NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management, Section 8.3.30, Use Inside of Federal Owned Aircraft Devices that Re-radiate Signals Received from the GPS
  - Restricted to transmissions inside Federal owned aircraft
  - Within a Federal controlled range/facility/installation/cordoned zone
  - In flight use is limited to final 20 minutes before deployment
  - Frequency assignment
    - A “NR” station for a maximum of 2 years with possible renewal
    - Number of aircrafts equipped with these devices
  - Maximum EIRP is not greater than -141 dBm/24 MHz at 20 meters from aircraft skin with all access doors open
  - Total GPS re-radiator system group delay shall not exceed 200 nanoseconds
  - A “Stop Buzzer” point of contact must be available all times
  - Approved frequency assignments will be entered in Government Master File

QUESTIONS ?